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ACQUISITION METHOD ON NETWORK, DEVICE INFORMATION
ACQUISITION APPARATUS ON NETWORK, AND RECORDING MEDIUM

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(71) Applicant: CASIO COMPUT CO LTD

(72) Inventor: Masatoshi Watanuki

[Abstract]

[Problem to be Solved]

    To reduce the overhead of an information-
acquisition-side device, and improve information
legibility by avoiding excessive information display.

[Solution]

    A device 2_i (i is 1 to 9) corresponds to a device
information acquisition apparatus used on a network 1
to which multiple devices are connected. This device
information acquisition apparatus receives information
including the device types of other devices, which has
been returned from the other devices in response to a
predetermined search request sent from one device to
the other devices or receives the information which has
been voluntarily sent from the other devices; and when
generating an information list including the device

types of the other devices on the basis of the information, the device information acquisition apparatus generates the information list by referring to a table including device types to be permitted which are set in advance and using only information having the device types included in the table among the information received from the other devices.

[Claims for the Patent]

[Claim 1]

A device information acquisition method used on a network to which multiple devices are connected, the method being characterized in:

receiving information including the device types of other devices, which has been returned from the other devices in response to a predetermined search request sent from one device to the other devices, or receiving the information which has been voluntarily sent from the other devices; and

when generating an information list including the device types of the other devices on the basis of the information, generating the information list by referring to a table including device types to be permitted which are set in advance and using only information having the device types included in the table among the information received from the other devices.

[Claim 2]

A device information acquisition method used on a network to which multiple devices are connected, the method being characterized in:

receiving information including the device types of other devices, which has been returned from the other devices in response to a predetermined search request sent from one device to the other devices, or

receiving the information which has been voluntarily sent from the other devices; and

when generating an information list including the device types of the other devices on the basis of the information, generating the information list by referring to a table including device types to be prohibited which are set in advance and using only information not having the device types included in the table among the information received from the other devices.

[Claim 3]

The device information acquisition method on the network according to any of claim 1 or 2, characterized in:

when the table is empty or when reconstructing the table, sending a search request to other device on the network;

temporarily performing registration of device types with the table with the use of information including the device types of the other devices, which has been returned from the other devices in response to the request;

after that, presenting the information registered with the table to a user to prompt the user to select the device types to be permitted or the device types to be prohibited; and

performing initial registration or reconstruction of the table by reflecting the user's selection and deleting the registered information of the table.

[Claim 4]

A device information acquisition apparatus on a network, characterized in comprising:

request means for requesting to acquire information including the device types of other devices on a network to the other devices;

receiving means for receiving the information returned from the other devices in response to the request or the information voluntarily sent from the other devices; and

generation means for generating an information list including the device types of the other devices with the use of the information received by said receiving means; wherein

said generation means refers to a table including device types to be permitted, which are set in advance, and generates the information list with the use of only information having the device types included in the table among the information received by said receiving means.

[Claim 5]

A device information acquisition apparatus on a network, characterized in comprising:

request means for requesting to acquire
information including the device types of other devices
on a network to the other devices;

receiving means for receiving the information
returned from the other devices in response to the
request or the information voluntarily sent from the
other devices; and

generation means for generating an information
list including the device types of the other devices
with the use of the information received by said
receiving means; wherein

said generation means refers to a table including
device types to be prohibited, which are set in advance,
and generates the information list with the use of only
information not having the device types included in the
table among the information received by said receiving
means.

[Claim 6]

A storage medium characterized in storing a
program for realizing: request means for requesting to
acquire information including the device types of other
devices on a network to the other devices; receiving
means for receiving the information returned from the
other devices in response to the request or the
information voluntarily sent from the other devices;
and generation means for generating an information list
including the device types of the other devices with

the use of information corresponding to the device
types in a table including device types to be permitted,
which are set in advance, among the information
received by said receiving means.

[Claim 7]

A storage medium characterized in storing a
program for realizing: request means for requesting to
acquire information including the device types of other
devices on a network to the other devices; receiving
means for receiving the information returned from the
other devices in response to the request or the
information voluntarily sent from the other devices;
and generation means for generating an information list
including the device types of the other devices with
the use of information not corresponding to the device
types in a table including device types to be
prohibited, which are set in advance, among the
information received by said receiving means.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a device
information acquisition method on a network and a
device information acquisition apparatus on a network,
and more particularly to a device information
acquisition method and a device information acquisition

apparatus preferably applicable to a network to which a lot of devices are connected.

[0002]

[Conventional Art]

Recently, the spread of networks used by linking electronic apparatuses mutually extends not only to use in offices but also to home appliances and other electric products which have been used independently. When such a network is referred to as a home network for convenience, this home network especially requires simplicity of connecting various apparatuses participating in the network (hereinafter referred to "devices"). This is because an amateur who is not familiar with network techniques performs connection of devices in the case of the home network.

[0003]

As one of network techniques which can respond to such a request, a technique called Universal Plug and Play (UPnP) is known. The UPnP is characterized in that insertion/pulling-out of a live wire (so-called hot plug which enables participation into a network while power is on) is possible, that it does not require driver software and the like, and that it does not depend on the kind of OS (operating system) which operates on each device; and it is a technique especially preferable for use for a home network.

[0004]

To describe the outline of the UPnP, it is used on a network supporting protocols which have become substantial de facto standards in the Internet world, such as IP (Internet Protocol), TCP (Transfer Control Protocol), UDP (User Data-gram Protocol), HTTP (Hyper Text Transfer Protocol) and XML (eXtensible Markup Language). The UPnP executes a step called addressing to acquire its own device ID (for example, an IP address) and then executes a step called discovery to search each devices on a network. Receiving a response from each device, the UPnP manages information included in the response, such as the classification, functions and the like of the device, as a list (hereinafter referred to as a "device information list" for convenience; this device information list corresponds to an "information list" described in the summary of the invention). Referring to the device information list, the UPnP specifies a desired device, for example, to request a service from the device.

[0005]

Now, it is assumed that n devices are connected to a network. The (n+1)th device (for example, a portable information terminal) which has been newly connected executes the addressing step first to acquire a device ID. It executes the discovery step to search the n devices to acquire information about the respective devices (the first to n-th devices), such as the

classifications, functions and the like, and generates a device information list including the information. The portable information terminal includes a display device, and it can display the contents of the device information list on the display screen. For example, if desiring printing of a document, such as a document created by a word processor, generated by the portable information terminal, the operator of the portable information terminal (hereinafter referred to as the "user") can receive a printing service via the network by displaying the device information list on the display screen, selecting a device which has a printing function (that is, a printer) from among the first to the n-th devices, and sending the document to the device.

[0006]

[Problems to be Solved by the Invention]

In the conventional art described above, all the device information on the network is acquired at the discovery step. However, there is a problem that, especially in the case of a network to which a lot of devices are connected, the number of pieces of device information increases in proportion to the number of devices, and the burden of the information acquisition processing and the device information list generation processing increases, and as a result, the overhead of the information-acquisition-side device increases.

[0007]

Furthermore, the devices connected to the network also perform periodical transmission for notifying information about itself to other devices, and the burden of the processing for receiving and analyzing such periodical notification also increases in the case of a network to which a lot of devices are connected. In this point also, there is a problem that the overhead of the information-acquisition-side device increases.

[0008]

Furthermore, as for those that are equipped with only a display device with a small sized screen, like a portable information terminal, there is a problem that, in the case of displaying a lot of device information, excessive information is displayed, and deterioration of information legibility cannot be avoided.

[0009]

Accordingly, the object to be achieved by the present invention is to make it possible to receive information from some devices and ignore information from the other devices, and thereby reduce the overhead of an information-acquisition-side device and avoid excessive display of information to improve the legibility of information, paying attention to that, even if a lot of devices exist on a network, it is some

of them that a lot of users actually use (or possibly use).

[0010]

[Means for Solving the Problems]

The present invention is a device information acquisition method used on a network to which multiple devices are connected, the method being characterized in: receiving information including the device types of other devices, which has been returned from the other devices in response to a predetermined search request sent from one device to the other devices, or receiving the information which has been voluntarily sent from the other devices; and when generating an information list including the device types of the other devices on the basis of the information, generating the information list by referring to a table including device types to be permitted which are set in advance and using only information having the device types included in the table among the information received from the other devices. In this invention, an information list is generated with the use of only information from particular devices having the device types which are included in a table in advance. Another invention is a device information acquisition method used on a network to which multiple devices are connected, the method being characterized in: receiving information including the device types of other devices,

which has been returned from the other devices in
response to a predetermined search request sent from
one device to the other devices, or receiving the
information which has been voluntarily sent from the
other devices; and when generating an information list
including the device types of the other devices on the
basis of the information, generating the information
list by referring to a table including device types to
be prohibited which are set in advance and using only
information not having the device types included in the
table among the information received from the other
devices. In this invention, an information list is
generated with the use of only information from
particular devices not having the device types which
are included in a table in advance. Furthermore, a
preferred aspect of these inventions is characterized
in: when the table is empty or when reconstructing the
table, sending a search request to other device on the
network; temporarily performing registration of device
types with the table with the use of information
including the device types of the other devices, which
has been returned from the other devices in response to
the request; after that, presenting the information
registered with the table to a user to prompt the user
to select the device types to be permitted or the
device types to be prohibited; and performing initial
registration or reconstruction of the table by

reflecting the user's selection and deleting the registered information of the table. In this aspect, the device types to be included in the table in advance are set through interaction with a user.

[0011]

[Embodiments of the Invention]

An embodiment of the present invention will be described below in detail with reference to drawings. Identification or exemplification of various details and exemplification of numerical values, character strings and other symbols in the description below are only for reference to clarify the spirit of the present invention, and it is apparent that the spirit of the present invention is not limited by all or some of them. As for well-known methods, well-known procedures, well-known architectures, well-known circuit configurations and the like (hereinafter referred to as "well-known items"), description of their details is avoided. This is intended to simplify the description and is not intended to exclude all or some of these well-known items. Since such well-known items can be known by one skilled in the art at the time of applying for a patent of the present invention, they are naturally included in the description below.

[0012]

Figure 1 is a diagram showing a schematic whole configuration of a network system to which this

embodiment is applied. In this system, to a network 1,
there are connected a lot of devices 2_i (in the figure,
nine devices are connected, for convenience, and
therefore, i denotes 1 to 9) which also function as
device information acquisition devices. The network 1
may be any network that supports internet protocols
such as IP, TCP, UDP, HTTP and XML, irrespective of the
classification of the medium (such as whether wired or
wireless). Furthermore, the network 1 may be locally
closed, or a part or all of the network 1 may be
globally opened. Furthermore, the network 1 may
include a DHCP (Dynamic Host Configuration Protocol)
server or a DNS (Domain Name System) server.

[0013]

    The device 2_i is an information processing
apparatus such as a personal computer and a portable
information terminal, a peripheral apparatus for
providing a required service for the information
processing apparatus, such as a printer, a home
information appliance or the like. However, the device
2_i may be any device if it is within the range
intended by the invention. That is, any device is
possible if it has a function of connecting to a UPnP-
compatible network.

[0014]

    Figure 2(a) is a diagram showing the electrical
block configuration of the device 2_i. This block

configuration shows a simplified and schematized internal configuration of an information processing apparatus such as a personal computer and a portable information terminal, though it is not limiting. In Figure 2(a), the device 2_i is provided with a CPU (Central Processing Unit) 11, and it is configured by connecting a program memory 13, a data memory 14, a work memory 15, an external input/output unit (abbreviated as an "external I/O") 16, an input unit 17, a display unit 18, a communication unit 19 and the like to the CPU 11 via a bus 12. The CPU 11 corresponds to request means, receiving means and generation means, and the communication unit 19 corresponds to the request means and the receiving means.

[0015]

By loading an OS or an application program stored in the program memory 13 to the work memory 15 and executing it, the CPU 11 realizes a required function which is described in the application program (for example, a function of editing a document) by organic combination of hardware and software. The program memory 13 is for storing the OS and application programs in advance, as described above. For example, a semiconductor storage device such as a flash memory and a read-only memory or a mass storage device such as a hard disk is used as the program memory 13.

[0016]

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The data memory 14 is for storing user-specific variable data non-volatilely (keeping the stored information even if the power is turned off). A flash memory or a random access memory backed up by a battery (or a part of a hard disk if the hard disk is provided) is used as the data memory 14. The user-specific variable data stored in the data memory 14 means variable data required when the above described OS or application program is executed, and typically, it is data such as the username of the device 2_i. However, in this embodiment, the user-specific variable data is assumed to especially refer to the "device information list" described before and a "device acquisition information judgment table" required for the UPnP protocol.

[0017]

The external I/O 16 is a general-purpose port for connecting other peripheral apparatuses. The input unit 17 is an input user interface part such as a keyboard, a pointing device and a touch panel. The display unit 18 is an output user interface part for displaying an image, character strings and the like to present information to a user.

[0018]

Figure 2(b) is a diagram showing another configuration of a main part of the device 2_i, and it is a configuration diagram of a main part, for example,

in the case where the device 2_i provides a printing service (a so-called printer). That is, a function unit 20 is a part for providing the printing service, and the function unit 20 is used instead of the external I/O 16 in Figure 2(a). Now, if it is assumed that the device 2_1 is a printing requesting source and the device 2_2 has the function unit 20 provided with a printing function, a printing request from the device 2_1 is communicated to the communication unit 19 of the device 2_2 via the network 1, and the function unit 20 of the device 2_2 performs printout of an object targeted by printing, such as a document, given from the device 2_1, under the operation control of the CPU 11 via the bus 12.

[0019]

　　Figure 3 is a conceptual configuration diagram of the communication unit 19. In this configuration diagram, the communication unit 19 is provided with a UPnP protocol unit 21 and a network unit 22. The UPnP protocol unit 21 is provided with respective units corresponding to the respective steps of the UPnP protocol, which are represented by an addressing unit 21a, a discovery unit 21b.... The network unit 22 is in charge of signal transmission and receiving at the physical layer level such as Ethernet (registered trademark), and the UPnP protocol unit 21 is in charge of signal transmission and receiving at the UPnP

protocol level which is immediately higher than the physical layer level. The roles of each unit of the UPnP protocol unit 21 is described in detail, for example, in a well-known document, "Universal Plug and Play Device Architecture" Version 1.0, 08 Jun 2000 10:41 AM (the location of the document: http://www.upnp.org/UPnPDevice_Architecture_1.0.htm). The summary of the document is as follows.

[0020]

    <Addressing unit 21a> The devices 2_i acquires its own device ID (hereinafter referred to as an "IP address") via this addressing unit 21a. When a DHCP server is provided within the network 1, the target from which the IP address is acquired is the DHCP server. When the DHCP server does not exist or is not found, the target from which the IP address is acquired is the addressing unit 21a itself. That is, in the latter case, the addressing unit 21a selects an IP address from a set of some local IP addresses prepared in advance, which does not correspond to the IP address of the other devices 2_i, and assigns the IP address as the device id of the device 2_i.

[0021]

    In this way, the device 2_i can acquire the one and only unique device ID in the network 1, by the addressing unit 21a. After that, the device 2_i can perform mutual communication with the other devices 2_i

by the IP protocol group, with the use of this device ID.

[0022]

    <Discovery unit 21b> The discovery unit 21b is used by the device 2_i which has acquired a device ID as described above. The discovery unit 21b searches each device 2_i connected to the network 1, receives a response from each device 2_i, and manages information such as device classification, functions and the like included in the response as a list ("device information list"). Furthermore, the discovery unit 21b receives periodical notification from each device 2_i connected to the network 1 and manages information such as device classification, functions and the like included in the notification as a list ("device information list").

[0023]

    In this way, by the search or the receiving of notification from other devices by the discovery unit 21b, the device 2_i can manage the information such as device classification, functions and the like of each device 2_i connected to the network 1 as a list (device information list), and can receive, for example, a printing service with the use of this list information.

[0024]

    For the format for the search by the discovery unit 21b and the format for the response to the search,

the SSDP (Simple Service Discovery Protocol) is used as exemplified below.

(1) Example of format for search request

    M-SEARCH*HTTP/1.1 ...... (first line)

    S: uuid: ...... (second line)

    HOST: 239.255.255.250:1900 ...... (third line)

    MAN: "ssdp: discover" ...... (fourth line)

    ST: "xxxx" ...... (fifth line)

    MX: m ...... (sixth line)

[0025]

To describe the contents of the format, the first line expressly shows that device search is to be performed with the format of version 1.1. The second line expressly shows that the device ID of the search requesting source (S) is "uuid". The third line expressly shows an IP address for multicasting which is secured for a requested communication channel or the SSDP and a port number therefor. The fourth line expressly shows the classification of the message (in the case of search, "ssdp: discover"). The fifth line expressly shows the classification of a device to be searched. For example, when "xxxx" is "ssdp: all", devices of all kinds are targeted by the search. When a character string indicating a particular device classification (for example, a character string such as "ssdp: printer", though this example may not exist in the rules of the UPnP protocol) is specified, only

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devices of that kind (in this case, only devices having
a printer function) are targeted by the search. The
sixth line expressly shows the maximum number of
seconds of delay in a response to the search.

[0026]

(2) Example of format for response to search

HTTP/1.1 200 OK ...... (first line)

Cache-Control: no-cache="Ext", max-age=500 ......
(second line)

EXT ...... (third line)

S: uuid: ...... (fourth line)

ST: "xxxx" ...... (fifth line)

USN: uuid: ...... (sixth line)

AL: <blender:ixl><http://foo/bar/> ...... (seventh
line)

[0027]

To describe the contents of the format, the first
line expressly that this is a response of a device.
The second line expressly shows the term of validity of
this message (in this example, 500 seconds). The third
line expressly shows that the MAN header of the search
request message (see (1) above) on which this response
message is based is understood by the search target
(the source sending this response message). The fourth
line expressly shows that the device ID of the search
request source (S) is "uuid". The fifth line expressly
shows the classification of a device to be searched

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(the same as the ST header in (1) above). The sixth
line expressly shows the USN (Unique Service Name) of
the device ID of the search request source (S). The
seventh line expressly shows the name and the location
in the network (the download position) of a UPnP device
control file (generally, an XML file) required for
using the source device sending the response message
from other devices.

[0028]

　　In the above configuration, the device 2_i
connected to the network 1 acquires a device ID (IP
address) with the use of the addressing unit 21a
provided for the communication unit 19 in the device
2_i itself, and then searches other devices 2_i
connected to the network 1 with the use of the
discovery unit 21b provided for the communication unit
19. It receives responses to the search from the other
devices 2_i, acquires information such as the
classification of each of the devices 2_i (hereinafter
referred to a "device type") and functions, and
generates and manages a device information list.
Furthermore, the device 2_i connected to the network 1
also receives information which is periodically
notified from the other devices 2_i connected to the
network 1, and it also updates and manages the device
information list on the basis of this information.

[0029]

The format of the information from the other devices 2_i connected to the network 1 (the search response information or the periodically notified information described above) is the search response format example (2) described above. For example, if it is assumed that the number of the other devices 2_i connected to the network 1 is n, and "ssdp: all" is specified at the ST header of a search request, then the search-request-side device has to perform analysis processing of n pieces of search response information.

[0030]

Therefore, in the case where n is a large number, that is, in the case where a lot of devices 2_i are connected to the network 1, there is a problem that the processing burden of the search-request-side device increases, the overhead increases, the processing speed becomes slow, and, as a result, the user feels stressed when performing an operation. In the case where the display ability of the display unit 18 of the search-request-side device is low, there is a problem that it is difficult especially for a device provided with only a small-sized display screen, such as a portable information terminal, to display device information about all the n devices (a device information list) in a manner that the device information can be easily seen, and the result is display with excessive information or display that forces a user to perform scrolling, which

leads to deterioration of information legibility and operability.

[0031]

Accordingly, this embodiment adopts the configuration described below in order to make it possible to receive only information from some devices to be actually used (or possibly used) by a user and ignore information from the other devices so that increase in the overhead of the device can be avoided and improvement of information legibility and operability can be achieved.

[0032]

First, a predetermined table (referred to as a "device acquisition information judgment table" in this embodiment) is provided in the data memory 14. Figure 4 is a conceptual diagram of a device acquisition information judgment table 23. This table 23 has a row/column structure in which a row indicates a record and a column indicates a field. One record is configured by at least a No. field 23a for storing a record number and a device type field 23b for storing device type information. The device type information is device classification information specified by the UPnP protocol. For example, in the case of a device having a printer function, the device type information is indicated by a character string such as "printer".

[0033]

Now, in the table 23 shown in the figure, character strings "A", "B" and "C" for convenience are stored in the device type fields 23b of the records No. 1 to No. 3, respectively. It is assumed that each of these character strings indicates one device classification. The device acquisition information judgment table 23 having such a structure is used by a device information acquisition processing program to be described next.

[0034]

Figure 5 is a diagram schematically showing a flowchart of the device information acquisition processing program. This program is executed when the CPU 11 acquires information from other devices 2_i connected to the network 1 with the use of the discovery unit 21b. When the program is started, 1 is set for a loop variable i for initialization (step S11).

[0035]

Next, the device acquisition information judgment table 23 in Figure 4 is opened to look up the value of the device type field 23b of the record with the number i (step S12). Now, since i=1 is set, the device type "A" stored in the record with the number 1 is looked up at this stage. Next, it is judged whether the looked-up device type ("A") and the device type of the device targeted by information acquisition correspond to each other (step S13).

[0036]

Here, the "device targeted by information acquisition" is a device which has sent the search response format example (2) described above, and the "device type of the device targeted by information acquisition" is the device classification character string set at the ST header of the search response format example (2). Therefore, if, for example, "A" is set as the device type of the device targeted by information acquisition, the result of the judgment at step S13 is "YES", and otherwise, the result is "NO".

[0037]

If the result of the judgment at step S13 is "YES", that is, if the device type looked up from the i-th record of the device acquisition information judgment table 23 and the device type of the device targeted by information acquisition correspond to each other, then the information acquisition processing is executed (step S14). On the other hand, if the result of the judgment at step S13 is "NO", that is, if the device type looked up from the i-th record of the device acquisition information judgment table 23 and the device type of the device targeted by information acquisition do not correspond to each other, then the information acquisition processing is not executed. The "information acquisition processing" refers to generation processing or update processing of the

device information list. By executing this information acquisition processing, various information (classification, functions and the like) about the device targeted by information acquisition can be registered with the device information list.

[0038]

In any of the cases, it is judged next whether i=imax (imax is the number of records of the device acquisition information judgment table 23) is satisfied (step S15). If i=imax is not reached, in other words, if the final record of the device acquisition information judgment table 23 is not reached, then the loop variable i is updated by adding 1 thereto (step S16). The processing after step S12 described above is repeated, and the program ends when i=imax is judged.

[0039]

According to the program described above, it is possible to receive search response information or periodical notification information from other devices 2_i connected to the network 1, and, only when the device type included in the information (the device type of a device targeted by information acquisition) corresponds to a device type stored in the device acquisition information judgment table 23, generate or update a device information list with the use of the search response information or the periodical

notification information from the device targeted by information acquisition.

[0040]

Therefore, when the device types stored in the device acquisition information judgment table 23 are only "A", "B" and "C", the device information list can be generated or updated with the use of only the search response information or periodical notification information from the devices targeted by information acquisition which have the device type ("A", "B" or "C"). As for search response information or periodical notification information from the devices targeted by information acquisition which have other device types (for example, "D", "E" …), the information can be ignored so that execution of the information processing (step S14) can be prevented.

[0041]

As a result, according to this embodiment, it is possible to receive only information from some devices (in the above example, those having the device type "A", "B" or "C") to be actually used (or to be possible used) by the user and ignore information from the other devices, and thereby, it is possible to obtain a special effect of avoiding increase in the overhead of the device and achieving improvement of information legibility and operability.

[0042]

The present invention is not limited to the embodiment described above, and various variations are naturally possible within the range of the intention of the invention. For example, a part of the above program may be changed as shown in Figure 6(a). In Figure 6(a), the difference from the above program is that "YES" and "NO" at the device type judgment step (step S13) are exchanged with each other. Thereby, the information acquisition processing (step S14) can be executed only when the device type of a device targeted by information acquisition does not correspond to the device types stored in the device acquisition information judgment table 23 ("A", "B" and "C"), and, contrary to the embodiment described above, it is possible to refuse information from some devices which are not actually used (or not possibly used) by a user (those that have the device type "A", "B" or "C" in the above example), receive information from the other devices and executes the information acquisition processing.

[0043]

The initial registration with the device acquisition information judgment table 23 may be performed as shown in Figure 6(b) and Figure 7, though it is not described in the embodiment described above. In Figure 6(b), it is judged first whether the device acquisition information judgment table 23 is empty or

not (the number of records: 0) (step S21). If the
number of records is 0, table registration processing
(step S22) for the initial registration of the device
acquisition information judgment table 23 is executed.
[0044]

Figure 7 is a conceptual diagram showing a
flowchart of a table registration processing program.
In this figure, when the program is started, 1 is set
for the loop variable i first for initialization (step
S21a). Next, the device type of a device targeted by
information acquisition is acquired and is stored in
the device type field 23b of the record with the number
i in the device acquisition information judgment table
23 (step S21b).
[0045]

Next, it is judged whether there is another device
from which information is to be acquired (step S21c).
If there is another device from which information is to
be acquired, 1 is added to the loop variable i (step
S21d), and after that, the processing after step S21b
is executed again. If there is not another device from
which information is to be acquired, the data stored in
the device acquisition information judgment table 23 is
processed to be in such a form that they can be easily
seen, and outputted to the display unit 18. Looking at
the display, the user operates the input unit 17 to

instruct deletion of data from the table if there is
any data to be deleted.

[0046]

Next, the program judges whether there is a
deletion instruction by the user (step S21f). If there
is a deletion instruction, the program deletes the
appropriate record from the device acquisition
information judgment table 23 (step S21g). After that,
the program executes the table information display step
(step S21e). This is repeated, and the program ends
when there is not a deletion instruction any more.

[0047]

Thus, according to this, it is possible to, when
the device acquisition information judgment table 23 is
empty, acquire the device types of all the devices
connected to the network 1 and initially register them
with the device acquisition information judgment table
23, and it is also possible (i) to, from the registered
data, leave the device types of some devices to be
actually used (or possibly used) by the user and delete
the other device types or (ii) leave the device types
of some devices not to be actually used (or not to be
possibly used) by the user and delete the other device
types. As a result, a device acquisition information
judgment table 23 applicable to the program in Figure 5
can be configured in the case of (i), and a device
acquisition information judgment table 23 applicable to

the program in Figure 6(a) can be configured in the
case of (ii).

[0048]

The programs in Figure 6(b) and Figure 7 may be,
of course, executed at the time of initial registration
of the device acquisition information judgment table 23.
Additionally, it may be executed, for example, when the
data of the device acquisition information judgment
table 23 is reconstructed at any point of time.

[0049]

The main functions of this embodiment are
functionally realized by organic combination of
hardware property including a microcomputer and
software property such as an operating system and
various programs. However, as for the hardware
property and the operating system, those for general
purposes can be used. Therefore, it can be said that
the indispensable items required for the present
invention are substantially the program in Figure 5 or
the program in Figure 6(a) (and the programs in Figure
6(b) and Figure 7). Accordingly, the present invention
includes recording media, such as a floppy disk, an
optical disk, a compact disk, a magnetic tape, a hard
disk and a semiconductor memory, in which all or a main
part of these programs are stored or a component (a
unit product, a finished product or a semi-finished
product) including the recording media. As the above

recording media or the component, not only those that are placed on distribution channels themselves but also those that are on the network and provide only the recorded contents are included.

[0050]

[Advantages of the Invention]

According to the present invention, an information list is generated with the use of only information from particular devices which have the device types which are included in a table in advance. Therefore, it is possible to receive only information from some devices and ignore information from the other devices, and thereby, it is possible to reduce the overhead of an information-acquisition-side device and to avoid excessive information display and improve information legibility. Furthermore, according to another invention, an information list is generated with the use of only information from particular devices which do not have the device types included in a table in advance, contrary to the above invention. Therefore, similarly to the above invention, it is possible to receive only information from some devices and ignore information from the other devices, and thereby, it is possible to reduce the overhead of an information-acquisition-side device and to avoid excessive information display and improve information legibility. Furthermore, according to the preferred aspect of the

inventions, the device types to be included in the table are set through interaction with a user. Therefore, it is possible to register the device types of devices to be actually used (or possibly used) or of devices not to be actually used (or not to be possibly used) with the table through interaction with a user and construct a table which is preferably applied to any of the above inventions.

[Brief Description of the Drawings]

[Figure 1]

Figure 1 is a diagram showing a schematic whole configuration of a network system to which this embodiment is applied.

[Figure 2]

Figure 2 is a diagram showing the electrical block configuration of a device 2_i.

[Figure 3]

Figure 3 is a conceptual configuration diagram of a communication unit 19.

[Figure 4]

Figure 4 is a conceptual diagram of a device acquisition information judgment table 23.

[Figure 5]

Figure 5 is a diagram schematically showing a flowchart of a device information acquisition processing program.

[Figure 6]

Figure 6 is a diagram showing a variation example of the flowchart of the device information acquisition processing program.

[Figure 7]

Figure 7 is a conceptual diagram showing a flowchart of a table registration processing program.

[Description of Symbols]

1　network

2_i　device (device information acquisition apparatus)

11　CPU (request means, receiving means, generation means)

19　communication unit (request means, receiving means)

23　device acquisition information judgment table (table)

Figure 1

2_1 TO 2_9   DEVICE

Figure 2(a)

13   PROGRAM MEMORY

14   DATA MEMORY

15   WORK MEMORY

16   EXTERNAL I/O

17   INPUT UNIT

18   DISPLAY UNIT

19   COMMUNICATION UNIT

Figure 2(b)

20   FUNCTION UNIT

Figure 3

21a   ADDRESSING UNIT

21b   DISCOVERY UNIT

Figure 4

23b   DEVICE TYPE

Figure 5

S12   LOOKS UP RECORD NO. i

S13   DOES DEVICE TYPE CORRESPOND TO DEVICE TYPE OF
        DEVICE TARGETED BY INFORMATION ACQUISITION?

S14   INFORMATION ACQUISITION PROCESSING

#1   DEVICE INFORMATION ACQUISITION

#2   END

Figure 6(a)

S13   DOES DEVICE TYPE CORRESPOND TO DEVICE TYPE OF
      DEVICE TARGETED BY INFORMATION ACQUISITION?

S14   INFORMATION ACQUISITION PROCESSING

Figure 6(b)

S21   IS TABLE EMPTY?

S22   TABLE REGISTRATION PROCESSING

S12   LOOKS UP RECORD NO. i

#1   DEVICE INFORMATION ACQUISITION

#2   END

Figure 7

S21b STORES DEVICE TYPE OF DEVICE TARGETED BY
      INFORMATION ACQUISITION IN RECORD NO. i

S21c IS THERE ANOTHER DEVICE TARGETED BY INFORMATION
      ACQUISITION

S21e DISPLAYS INFORMATION OF TABLE

S21f IS THERE DELETION INSTRUCTION BY USER?

S21g DELETES SPECIFIED RECORD

#1   TABLE REGISTRATION ACQUISITION

#2   END